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10/066,270	01/31/2002	Keith W. Holt	01-869	4428

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EXAMINER	
TORRES, JOSEPH D	
ART UNIT	**PAPER NUMBER**
2133	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/066,270	HOLT, KEITH W.	
	Examiner	Art Unit	
	Joseph D. Torres	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-8,10,11,13,23 and 25-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-8,10,11,13,23 and 25-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *07/20/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 6-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "the reconstructed data error detection and correction code" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim. The Examiner assumes the Applicant intended: --the generated error detection and correction code--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1, 3-8, 10, 13, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Idleman; Thomas E. et al. (US 5274645 A, hereafter referred to as Idleman) in view of Weng; Lih-Jyh (US 5265104 A).

35 U.S.C. 103(a) rejection of claims 1 and 23.

Idleman teaches reading data from the data disk drive (col. 21, lines 51-68 in Idleman and col. 20, lines 11-14 in Idleman);

generating an parity code from the data read from the data disk drive (col. 21 lines 61-68 in Idleman teaches that during a parallel read operation, ACC 348 uses the P and Q terms to determine if the data being received from the disk drives is correct; Note: one of ordinary skill in the art at the time the invention was made would have recognized that an such a check is a standard process whereby new P and Q terms are regenerated and compared to the read P and Q terms however, if the Applicant is aware of any other reasonable method of doing an error check, the Applicant is welcome to present the details on the method and on reasons why any one of ordinary skill would choose to use such a method when such a simple cost-effective recognized industry-prevalent and established method by regenerating P and Q terms already exists [col. 23, lines 45-47 allude to this process by affirming P and Q terms are only calculated when all data are read in parallel so that all the data necessary to calculate P and Q terms is present]); and

in parallel with the reading of the data from the data disk drive and the generating a parity code from the data read from the data disk drive, reading parity metadata (col. 21 lines 55-68 in Idleman teaches a parallel read operation comprises reading data, P and Q parity and using P and Q terms to determine if the data being received from the disk drives is correct; Note: one of ordinary skill in the art at the time the invention was made would have recognized that an such a check is a standard process whereby new P and Q terms are regenerated and compared to the read P and Q terms however, if the Applicant is aware of any other reasonable method of doing an error check, the Applicant is welcome to present the details on the method and on reasons why any one of ordinary skill would choose to use such a method when such a simple cost-effective recognized industry-prevalent and established method by regenerating P and Q terms already exists [col. 23, lines 45-47 in Idleman allude to this process by affirming P and Q terms are only calculated when all data are read in parallel so that all the data necessary to calculate P and Q terms is present]);

comparing the generated error detection and correction code of the read data with the error detection and correction code stored as metadata (col. 23, lines 45-47 in Idleman);

determining data validity of data read from the data disk drive based on the comparison of error detection and correction code metadata and the generated error detection and correction code (col. 21 lines 55-68 in Idleman teaches a parallel read operation comprises reading data, P and Q parity and using P and Q terms to determine if the data being received from the disk drives is correct),

wherein the parity metadata is stored in a disk drive separate from the data read from the data disk drive (see P and Q drives in Figure 10 of Idleman). Note also that Idleman teaches the use of a Reed Solomon error correction and detection ECC code (col. 18, lines 23-29 in Idleman; Note: a systematic Reed-Solomon code is an error correction and detection CRC code) and the generation of the ECC code in the ACC 348 in Figure 10 of Idleman during a parallel read operation.

However Idleman does not explicitly teach the specific use of an error detection and correction code cyclic redundancy check that is stored in separate disk drives.

Weng, in an analogous art, teaches use of an error detection and correction code cyclic redundancy check that is stored in separate disk drives (the Abstract in Weng teaches using an (n,k) distance D Reed-Solomon code to generate, for each set of k symbols stored on k data drives, n-k redundancy symbols, and recording the generated symbols in the corresponding storage locations on each of the n-k separate redundant drives; Note: a systematic Reed-Solomon code is a CRC code).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Idleman with the teachings of Weng by including use of an error detection and correction code cyclic redundancy check that is stored in separate disk drives. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of an error detection and correction code cyclic redundancy check that is stored in separate disk drives would have provided a means

for reducing the number of redundant drives required for implementing a robust drive system with immunity to errors (col. 2, lines 6-27 in Weng).

35 U.S.C. 103(a) rejection of claim 3.

Col. 21 lines 61-68 in Idleman teaches that during a parallel read operation, ACC 348 uses the P and Q terms to determine if the data being received from the disk drives is correct. Claim 25 in Idleman teaches comparing said check error detection term to said at least one error detection term to determine that said data has been not corrupted.

35 U.S.C. 103(a) rejection of claim 4.

Claim 26 in Idleman teaches correcting data if it is determined that said data has been corrupted.

35 U.S.C. 103(a) rejection of claim 5.

Col. 22, lines 44-55 in Idleman teaches regeneration of data. Note: data includes ECC and parity.

35 U.S.C. 103(a) rejection of claims 6-8.

Col. 21 lines 61-68 in Idleman teaches that during a parallel read operation, ACC 348 uses the P and Q terms to determine if the data being received from the disk drives is correct. Claim 25 in Idleman teaches comparing said check error detection term to said at least one error detection term to determine that said data has been not corrupted.

35 U.S.C. 103(a) rejection of claim 10.

Reed-Solomon and simple parity codes are block codes.

35 U.S.C. 103(a) rejection of claim 13.

See data drives 0-3 and parity drives P and Q in Idleman. The Abstract in Weng teaches redundant drives for storing Reed-Solomon ECC data.

35 U.S.C. 103(a) rejection of claim 25.

Col. 21 lines 61-68 in Idleman teaches that during a parallel read operation, ACC 348 uses the P and Q terms to determine if the data being received from the disk drives is correct. Claim 25 in Idleman teaches comparing said check error detection term to said at least one error detection term to determine that said data has been not corrupted.

3. Claims 11 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Idleman; Thomas E. et al. (US 5274645 A, hereafter referred to as Idleman) and Weng; Lih-Jyh (US 5265104 A) in view of Iwatani; Sawao (US 6023780 A).

35 U.S.C. 103(a) rejection of claim 11.

Idleman and Weng substantially teaches the claimed invention described in claims 1, 3-8 and 10 (as rejected above).

However Idleman and Weng does not explicitly teach that the size of the error detection and correction code metadata is 4 bytes per 512 bytes of data read from the disk drives. The Examiner asserts that Iwatani, in an analogous art, teaches n blocks of data are encoded to produce a single parity block. If n=128 then the size of the error detection and correction code parity metadata is 4 bytes per 512 bytes of data read from the disk drives, hence 4 parity bytes per 512 bytes of data is a specific embodiment of the teachings in the Iwatani patent. One of ordinary skill in the art at the time the invention was made would have been highly motivated to select a specific embodiment based on obvious Engineering Design choice requirements such as data rate and error rate requirements.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Idleman and Weng patents with the teachings of the Iwatani patent by selecting the size of the error detection and correction code metadata to be 4 bytes per 512 bytes of data read from the disk drives. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that selecting the size of the error detection and correction code metadata to be 4 bytes per 512 bytes of data read from the disk drives would have provided the opportunity to implement a specific embodiment of the teachings in the Iwatani patent based on obvious Engineering Design choice requirements such as data rate and error rate requirements.

35 U.S.C. 103(a) rejection of claim 26.

CRC Check S10 in Figure 6 of Iwatani teaches comparing the error detection and correction code stored as metadata RP in Read Operation 17-5 of Figure 5 of Iwatani with the new reconstructed host CRC check data error detection and correction code (see col. 19, lines 55-61 in Iwatani).

35 U.S.C. 103(a) rejection of claims 27 and 28.

Step S11 in Figure 6 of Iwatani teaches that if the error detection and correction code stored as metadata RP in Read Operation 17-5 of Figure 5 of Iwatani matches the new reconstructed host CRC check data error detection and correction code, then accepting the reconstructed data as valid data (see col. 19, lines 55-61 in Iwatani).

Step S10 in Figure 6 of Iwatani teaches that if the error detection and correction code stored as metadata RP in Read Operation 17-5 of Figure 5 of Iwatani does not match the new reconstructed host CRC check data error detection and correction code, then accepting the data read from the data drive as valid data (see col. 19, lines 55-61 in Iwatani; Note: the reconstructed data that is finally accepted after various iterations is data reconstructed from data read from the hard drive: Note also that in the second iteration, if the CRC is corrupted, then the reconstructed data is identically data read from the data drive).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JOSEPH TORRES
PRIMARY EXAMINER

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